Urban Biodiversity: Successes and Challenges: Integrated habitat networks in our dear green space.

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ABSTRACT

The development of the spatial habitat networks known as Integrated Habitat Networks (IHN) was developed with a range of partners using GIS and suite of spatial analyst tools known as BEETLE. The first habitat networks were produced for the Glasgow and Clyde Valley area in 2008. A post was developed to disseminate the resultant woodland, grassland and wetland networks to local authorities and to assist them with the task of utilising these visual networks in development planning, development management and Master planning.

It has been used in a variety of trial projects working with architects, planners, SEPA and SNH and the use of IHN for production of green networks is slowly gaining momentum. A hypothetical use of IHN was illustrated within a presentation at the Glasgow Naturalist conference to visually demonstrate its use in land management and to illustrate the very visual use of the IHN.

INTRODUCTION

In 2009 I started as project officer for the Glasgow and Clyde Valley Green Network Partnership (GCVGNP) and SNH. We are very lucky in Glasgow as the Glasgow and Clyde Valley Structure Plan promotes the vision of a Green Network and the newly emerging Strategic Development Plan carries this vision within its Main Issues Report (MIR). Our area could be considered pioneers of the green network concept as we are fortunate in having a GCVGNP team. In 2008 Forest Research were commissioned to produce habitat networks for the GCV area and to illustrate where these networks "integrated" thus producing Priority Enhancement Areas (PEA's). This was undertaken using GIS and a suite of spatial analyst tools collectively given the name BEETLE (Biological and Environmental Evaluation Tools for Landscape Ecology).

The Planning etc. (Scotland) Act 2006 resulted in the previously non-statutory National Planning Framework (NPF) becoming a statutory document and this is effectively a spatial plan for Scotland. The Act also makes provision for the Framework to designate national developments. Within NPF2 (2009) The Central Scotland Green Network (CSGN) is one of these national developments and the location and design of integrated habitat networks is clearly stated as one of the matters to be addressed in the creation of a CSGN. Additionally the national developments should be included within Strategic Development Plans (SDP) and Local Development Plans (LDP). The IHN has been used to assist within the planning process and small pilot projects have been undertaken in several areas now. To borrow from the Main Issues Report (MIR) for the Edinburgh and South East Scotland SDP (2010) known as SESPlan, the Green Network could be defined:

> "[it] comprises the network of green spaces within and around our towns and cities, linking out into the wider countryside, which underpins the region's quality of life and sense of place and provides the setting which high quality, sustainable economic growth occurs"

SETTING THE SCENE

Spatial tool.

The Integrated Habitat Networks allow us to spatially see where our efforts can be concentrated. We can see very visually see where the habitats cluster into networks and equally we can see where the habitats sit in isolation (Fig.1). Lastly the modelling process gives us an indication of the possible spread of species to surrounding habitat areas by using a process known as least cost distance analysis and this gives an indication of the networks that are possible in the future if there are to be no land use changes. These are the habitat networks illustrated by BEETLE.

Fig. 1. Example illustrating woodland habitat "clustering" and sitting in isolation

However the question of whether or not to target action to habitat clusters and also the sensitive subject of whether or not to concentrate efforts *only* on these larger areas capable of forming habitat networks will depend on a variety of factors outwith that of forming habitat networks alone. Priorities will vary on an area to area basis but will include factors such as socio-economies, sense of place and therefore local

importanee as well as that of providing "stepping stones" for species. The list is not exhaustive.

Uses

To date SEPA and the GCVGN partnership has commissioned a Clyde pilot study "Ecologieal Networks and River Basin Management Plans (RBMP)" (Entec 2010) in order to to align the RBMP objectives with an IHN for this area. Opportunities have been identified addressing diffuse pollution and reduction of morphological pressures on watercourses whilst also enhancing the IHN . It has also been used to aid the master planning process in Glasgow and South Johnstone and at development plan level was used in the Strategie Environmental Assessment for the South Lanarkshire Minerals Plan.

What does it actually do?

The IHN addresses habitat fragmentation by very visually illustrating the habitats that are in existence and the concentration is on wetland, woodlands and grasslands. Using a foeal species approaeh to assess the functional conneetivity of habitat for species distribution, a limited number of speeies were used to map the IHN's. This generalises the species requirements for a partieular habitat and is widely used in habitat network modelling. It also removes the need to carry out a large number of individual species analyses (Smith 2008). Those used have included mountain hare *Mustela putorius*, great crested newt *Triturus cristatus*, red admiral *Vanessa atlanta* , dogs mercury *Mercurialis perennis* and water avens *Geum rivale* (Fig. 2). They eneapsulate species requirements for particular habitats. Similar habitats in turn have been collated to form generalist habitats, woodland, wetland and grassland (Fig. 3) it is however possible to separate the network components to show specialised networks using GIS. Networks such as acid grassland and ancient woodland can be clearly illustrated for example and this ability to "drill down" may prioritise our land management decisions in the future.

The process of habitat network modelling has been taken a step further near Inverness as part of the planning process for Tornagrain to try to ensure that red squirrel strongholds are retained and expanded using the least cost distance analysis pioneered by Scottish Natural Heritage and Forest Research. Maps have been produced to illustrate the existing red squirrel areas and also the areas that could host red squirrels. All possible very quickly by computer modelling.

IHN MODELLING IN GLASGOW

The city of Glasgow is always depicted as the "dear green place". The IHN generalist habitat layers allow us to see where our networks lie and see where there is habitat fragmentation. Phase 1 data, master map and a variety of other data sets have been used to calculate the networks. Note that the habitat networks are not wildlife corridors. They are a component of the green network but the habitats within the IHN must fulfil certain criteria to be part of this so for example amenity grassland is generally not part of the habitat network. As mentioned previously it is even possible to further refine our visual display to show where our areas of ancient woodland are within the woodland generalist layer and additionally to use the modelling process to show how the network could expand (Fig. 4).

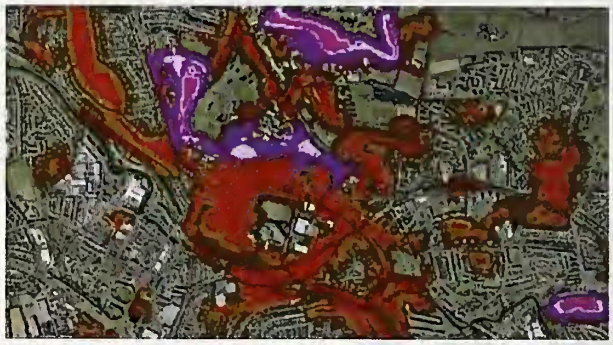

Fig. 4. Data licensed to Scottish Natural Heritage under the PGA, through Next Perspectives. Glasgow generalist woodland network (red), ancient woodland network (pink) and lilac and purple showing the possibility for expansion of the ancient woodland network.

To explain the IHN's possibilities it will be necessary to set the scene. Imagine that Glasgow has undergone a population explosion that necessitates the local authority to consider development of Dawsholm Park. I use this example beeause it is an instantly recognisable area on a map and it is an area valued for reasons other than that of being a valuable component of the IHN's! Fig. 4 shows that within the north west of Glasgow there is a substantial area of ancient woodland and also potential for ancient woodland expansion. However to look at the ancient woodland network for the whole of Glasgow (Fig 5) it is possible to see that these areas of ancient woodland are scarce throughout the city. Equally on a larger scale we can see at a glance where the habitat networks in Glasgow integrate and although the ecologists amongst us will be well aware of these "hotspots" it allows us to visually show the high habitat value of areas such as Possil Marsh SSSI which is an important *component* of the IHN. It does not sit in isolation (Fig. 5). Where the habitats networks integrate can be clearly seen as can areas that could be improved by appropriate land management can also be identified helping us to prioritise our habitat management.

Mountain hare *Lepus timidus*. © Lorne Gill

Red Admiral *Vanessa atalanta* © Lorne Gill.

Great crested newts *Triturus cristatus* © Sue Scott/SNH.

Water avens *Geum rivale* © Lorne Gill.

Dogs mercury *Mercurialis perennis*. © Lorne Gill/SNH

Fig. 2. Some of the focal species used for IHN analyses.

Woodland © Lorne Gill.

Wetland © Lorne Gill/SNH

Grassland habitat. Lorne Gill/SNH.

Fig. 3. Generalist habitats.

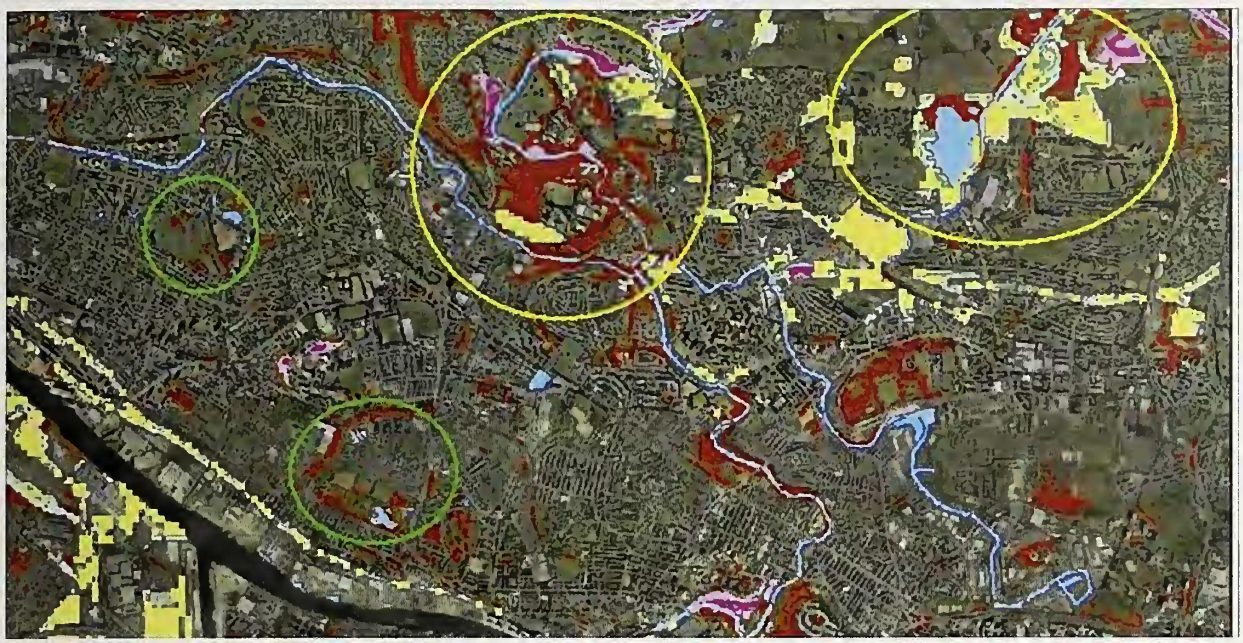

Fig. 5. Data licensed to Scottish Natural Heritage under the PGA, through Next Perspectives. Generalist woodland networks (red), ancient woodland (pink), grassland including marshlands (yellow and green) and wetland (blue).

WEB BROWSER TOOL

Scottish Natural Heritage is presently working on a web browser tool to allow all of us with a land management interest to access the IHN layers to assist with our land management decisions. It will be possible to graphically see the effect of development, land use changes and also to assist land agent with their Scottish Rural Development Priority applications as there will be a web browser tool to allow us to add and for that matter remove land to see the effect on the habitat networks. The ecological network modelling will be possible throughout Scotland and access will be possible via the SNH website. www.snh.org.uk.

CONCLUSION

The IHN is a spatial took which can assist us with our efforts to plan our green networks in only one area but also across our various local authorities. There will always be an element of ground truthing required but then the same can be said of any desk top analysis. Importantly we have the opportunity to strategically address habitat fragmentation and have a tool to assist us with the best possible "locations" for expansion of these networks.

FOOTNOTE

Since the conference in October IHN's have been created for the whole of the Central Scotland Green Network area. Data and further information can be obtained from the Central Scotland Green Network Support Unit.
http://www.centralscotlandgreennetwork.org.

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